

## Letter to the Editors

### Nuclear Testing and Public Health

Although the so-called Cold War may now be a thing of the past, the health ramifications of the nuclear arms buildup during the Cold War are far from being over. During the years 1945–1962, the Atomic Energy Commission carried out about 235 atmospheric nuclear tests. Many of the above-ground nuclear weapons tests, including more than 100 between 1951 and 1958, were carried out at the Nevada test site (1). It is not possible to give a precise figure on the number of military personnel and civilians who were exposed to radioactive fallout as the result of nuclear weapons testing. However, it is estimated that 203,000 military personnel and civilians were involved in the nuclear testing from 1945 to 1962 by the Atomic Energy Commission. And overall, an estimated 1–2 million Americans may have been exposed to radiation arising from nuclear weapons testing (2).

An important question, of ongoing public health concern, involves possible adverse health effects from the radioactive fallout of nuclear testing. People directly involved with nuclear testing, as well as persons living downwind of a nuclear weapons testing site, may be at considerable risk of developing health problems associated with radiation exposure (2). Risk of injurious radiation exposure arises from actual nuclear testing as well as from problems with storage tanks used for radioactive wastes. It is believed that at some nuclear weapons plants in the country, there is concern that some storage tanks used for radioactive wastes may be at risk of exploding (2).

Effects of radiation exposure on human health are incompletely understood. In the past, scientific studies of survivors of the atomic bombing of Hiroshima and Nagasaki have probably provided the most important data on immediate and long-term effects of acute, whole body exposure to ionizing radiation (3). Unfortunately, epidemiologic study of these survivors can only provide limited information about radiation effects. Radiation emanates from various sources, including medical, environmental, and occupational sources. Often, radiation from such sources is of an intermittent or continuous, low-dose nature (3). The studies of the atomic bomb survivors, however, pertain to a single, high-dose exposure to radiation.

In general, though, cancer is probably the major long-term effect of radiation exposure (1–4). It appears that bodily tissues especially sensitive to the cancer-causing action of radiation include the bone marrow, thyroid, and female breast (3). Cancer of the lung, bladder, colon, stomach, and esophagus may be linked as well to large radiation doses (3). Numerous claims have

been filed against the United States government stating in substance that the Atomic Energy Commission was negligent in conducting nuclear tests and that radiation fallout from such tests has caused adverse health effects. The government, in the past, has taken the position that the level of exposure to radiation resulting from testing did not result in a sufficiently high dose to cause the injuries claimed.

The government's position notwithstanding, the reality is that radiation in large doses causes cancer. In fact, it is probably wise to assume, in absence of clear evidence to the contrary, that there is no threshold level below which radiation exposure does not cause adverse health effects (3,5). Health risks possibly associated with exposure to "small" radiation doses is an area requiring further scientific study. Adverse health effects of low-dose radiation may particularly be a problem affecting workers in the nuclear facilities of utility companies and persons living near such facilities (6,7).

However difficult it may have been to end the Cold War, the task of decontaminating nuclear weapons facilities and relocating radioactive wastes may be more difficult. Accomplishing this task is expected to cost \$50 billion or more and to take 10–20 years (2). Scientific study needed to definitively establish possible relationships between low levels of radiation exposure and various health effects may take even longer. Especially in view of the serious public health questions involved, it is important to pursue these respective tasks fully and aggressively.

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